



## SEQUENCE LISTING

#4  
RECEIVED  
JUN 26 2001  
TECH CENTER 1600/2900

<110> Hong, Jin  
Tang, Roderick  
Li, Shengqiang  
Bryant, Martin

<120> Recombinant RSV Virus Expression Systems and Vaccines

<130> 7682-052-999

<140> 09/724,416

<141> 2000-11-28

<150> 60/060,153

<151> 1997-09-26

<150> 09/161,122

<151> 1998-09-25

<150> 09/368,076

<151> 1999-08-03

<150> 60/084,133

<151> 1998-05-01

<150> 60/089,207

<151> 1998-06-12

<160> 66

<170> PatentIn version 3.0

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Ser	Tyr	Ile	Phe	Asn	Gly	Pro	Tyr	Leu	Lys	Asn	Asp	Tyr	Thr	Asn	Leu
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	50					55				60					
Asn	Ile	Thr	Gln	Ser	Leu	Ile	Ser	Lys	Tyr	His	Lys	Gly	Glu	Ile	Lys
65					70					75				80	
Leu	Glu	Glu	Pro	Thr	Tyr	Phe	Gln	Ser	Leu	Leu	Met	Thr	Tyr	Lys	Ser
			85						90					95	
Met	Thr	Ser	Ser	Glu	Gln	Ile	Ala	Thr	Thr	Asn	Leu	Leu	Lys	Lys	Ile
			100					105					110		
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		115					120					125			
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	130					135					140				
Gln	Asp	Glu	Asp	Asn	Ser	Val	Ile	Thr	Thr	Ile	Ile	Lys	Asp	Asp	Ile
145					150					155					160

Leu	Ser	Ala	Val	Lys	Asp	Asn	Gln	Ser	His	Leu	Lys	Ala	Asp	Lys	Asn	165	170	175
His	Ser	Thr	Lys	Gln	Lys	Asp	Thr	Ile	Lys	Thr	Thr	Leu	Leu	Lys	Lys	180	185	190
Leu	Met	Cys	Ser	Met	Gln	His	Pro	Pro	Ser	Trp	Leu	Ile	His	Trp	Phe	195	200	205
Asn	Leu	Tyr	Thr	Lys	Leu	Asn	Asn	Ile	Leu	Thr	Gln	Tyr	Arg	Ser	Asn	210	215	220
Glu	Val	Lys	Asn	His	Gly	Phe	Thr	Leu	Ile	Asp	Asn	Gln	Thr	Leu	Ser	225	230	235
Gly	Phe	Gln	Phe	Ile	Leu	Asn	Gln	Tyr	Gly	Cys	Ile	Val	Tyr	His	Lys	245	250	255
Glu	Leu	Lys	Arg	Ile	Thr	Val	Thr	Thr	Tyr	Asn	Gln	Phe	Leu	Thr	Trp	260	265	270
Lys	Asp	Ile	Ser	Leu	Ser	Arg	Leu	Asn	Val	Cys	Leu	Ile	Thr	Trp	Ile	275	280	285
Ser	Asn	Cys	Leu	Asn	Thr	Leu	Asn	Lys	Ser	Leu	Gly	Leu	Arg	Cys	Gly	290	295	300
Phe	Asn	Asn	Val	Ile	Leu	Thr	Gln	Leu	Phe	Leu	Tyr	Gly	Asp	Cys	Ile	305	310	315
Leu	Lys	Leu	Phe	His	Asn	Glu	Gly	Phe	Tyr	Ile	Ile	Lys	Glu	Val	Glu	325	330	335
Gly	Phe	Ile	Met	Ser	Leu	Ile	Leu	Asn	Ile	Thr	Glu	Glu	Asp	Gln	Phe	340	345	350
Arg	Lys	Arg	Phe	Tyr	Asn	Ser	Met	Leu	Asn	Asn	Ile	Thr	Asp	Ala	Ala	355	360	365
Asn	Lys	Ala	Gln	Lys	Asn	Leu	Leu	Ser	Arg	Val	Cys	His	Thr	Leu	Leu	370	375	380
Asp	Lys	Thr	Val	Ser	Asp	Asn	Ile	Ile	Asn	Gly	Arg	Trp	Ile	Ile	Leu	385	390	395
Leu	Ser	Lys	Phe	Leu	Lys	Leu	Ile	Lys	Leu	Ala	Gly	Asp	Asn	Asn	Leu	405	410	415
Asn	Asn	Leu	Ser	Glu	Leu	Tyr	Phe	Leu	Phe	Arg	Ile	Phe	Gly	His	Pro	420	425	430
Met	Val	Asp	Glu	Arg	Gln	Ala	Met	Asp	Ala	Val	Lys	Ile	Asn	Cys	Asn	435	440	445
Glu	Thr	Lys	Phe	Tyr	Leu	Leu	Ser	Ser	Leu	Ser	Met	Leu	Arg	Gly	Ala	450	455	460
Phe	Ile	Tyr	Arg	Ile	Ile	Lys	Gly	Phe	Val	Asn	Asn	Tyr	Asn	Arg	Trp	465	470	475
Pro	Thr	Leu	Arg	Asn	Ala	Ile	Val	Leu	Pro	Leu	Arg	Trp	Leu	Thr	Tyr	485	490	495
Tyr	Lys	Leu	Asn	Thr	Tyr	Pro	Ser	Leu	Leu	Glu	Leu	Thr	Glu	Arg	Asp	500	505	510
Leu	Ile	Val	Leu	Ser	Gly	Leu	Arg	Phe	Tyr	Arg	Glu	Phe	Arg	Leu	Pro	515	520	525
Lys	Lys	Val	Asp	Leu	Glu	Met	Ile	Ile	Asn	Asp	Lys	Ala	Ile	Ser	Pro	530	535	540
Pro	Lys	Asn	Leu	Ile	Trp	Thr	Ser	Phe	Pro	Arg	Asn	Tyr	Met	Pro	Ser	545	550	555
His	Ile	Gln	Asn	Tyr	Ile	Glu	His	Glu	Lys	Leu	Lys	Phe	Ser	Glu	Ser	565	570	575
Asp	Lys	Ser	Arg	Arg	Val	Leu	Glu	Tyr	Leu	Arg	Asp	Asn	Lys	Phe		580	585	590
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Val	Gly	Arg	Met	Phe	Ala	Met	Gln	Pro	Gly	Met	Phe	Arg	Gln	Val	Gln	625	630	635	640
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Glu	Ser	Leu	Thr	Arg	Tyr	Gly	Asp	Leu	Glu	Leu	Gln	Lys	Ile	Leu	Glu	660	665	670	
Leu	Lys	Ala	Gly	Ile	Ser	Asn	Lys	Ser	Asn	Arg	Tyr	Asn	Asp	Asn	Tyr	675	680	685	
Asn	Asn	Tyr	Ile	Ser	Lys	Cys	Ser	Ile	Ile	Thr	Asp	Leu	Ser	Lys	Phe	690	695	700	
Asn	Gln	Ala	Phe	Arg	Tyr	Glu	Thr	Ser	Cys	Ile	Cys	Ser	Asp	Val	Leu	705	710	715	720
Asp	Glu	Leu	His	Gly	Val	Gln	Ser	Leu	Phe	Ser	Trp	Leu	His	Leu	Thr	725	730	735	
Ile	Pro	His	Val	Thr	Ile	Ile	Cys	Thr	Tyr	Arg	His	Ala	Pro	Pro	Tyr	740	745	750	
Ile	Gly	Asp	His	Ile	Val	Asp	Leu	Asn	Asn	Val	Asp	Glu	Gln	Ser	Gly	755	760	765	
Leu	Tyr	Arg	Tyr	His	Met	Gly	Gly	Ile	Glu	Gly	Trp	Cys	Gln	Lys	Leu	770	775	780	
Trp	Thr	Ile	Glu	Ala	Ile	Ser	Leu	Leu	Asp	Leu	Ile	Ser	Leu	Lys	Gly	785	790	795	800
Lys	Phe	Ser	Ile	Thr	Ala	Leu	Ile	Asn	Gly	Asp	Asn	Gln	Ser	Ile	Asp	805	810	815	
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Ala	Gly	Ile	Gly	His	Lys	Leu	Lys	Gly	Thr	Glu	Thr	Tyr	Ile	Ser	Arg	850	855	860	
Asp	Met	Gln	Phe	Met	Ser	Lys	Thr	Ile	Gln	His	Asn	Gly	Val	Tyr	Tyr	865	870	875	880
Pro	Ala	Ser	Ile	Lys	Lys	Val	Leu	Arg	Val	Gly	Pro	Trp	Ile	Asn	Thr	885	890	895	
Ile	Leu	Asp	Asp	Phe	Lys	Val	Ser	Leu	Glu	Ser	Ile	Gly	Ser	Leu	Thr	900	905	910	
Gln	Glu	Leu	Glu	Tyr	Arg	Gly	Glu	Ser	Leu	Leu	Cys	Ser	Leu	Ile	Phe	915	920	925	
Arg	Asn	Val	Trp	Leu	Tyr	Asn	Gln	Ile	Ala	Leu	Gln	Leu	Lys	Asn	His	930	935	940	
Ala	Leu	Cys	Asn	Asn	Lys	Leu	Tyr	Leu	Asp	Ile	Leu	Lys	Val	Leu	Lys	945	950	955	960
His	Leu	Lys	Thr	Phe	Phe	Asn	Leu	Asp	Asn	Ile	Asp	Thr	Ala	Leu	Thr	965	970	975	
Leu	Tyr	Met	Asn	Leu	Pro	Met	Leu	Phe	Gly	Gly	Gly	Asp	Pro	Asn	Leu	980	985	990	
Leu	Tyr	Arg	Ser	Phe	Tyr	Arg	Arg	Thr	Pro	Asp	Phe	Leu	Thr	Glu	Ala	995	1000	1005	
Ile	Val	His	Ser	Val	Phe	Ile	Leu	Ser	Tyr	Tyr	Thr	Asn	His	Asp	Leu	1010	1015	1020	
Lys	Asp	Lys	Leu	Gln	Asp	Leu	Ser	Asp	Asp	Arg	Leu	Asn	Lys	Phe	Leu	1025	1030	1035	1040
Thr	Cys	Ile	Ile	Thr	Phe	Asp	Lys	Asn	Pro	Asn	Ala	Glu	Phe	Val	Thr	1045	1050	1055	
Leu	Met	Arg	Asp	Pro	Gln	Ala	Leu	Gly	Ser	Glu	Arg	Gln	Ala	Lys	Ile	1060	1065	1070	
Thr	Ser	Glu	Ile	Asn	Arg	Leu	Ala	Val	Thr	Glu	Val	Leu	Ser	Thr	Ala	1075	1080	1085	

Pro	Asn	Lys	Ile	Phe	Ser	Lys	Ser	Ala	Gln	His	Tyr	Thr	Thr	Thr	Glu	
1090						1095				1100						
Ile	Asp	Leu	Asn	Asp	Ile	Met	Gln	Asn	Ile	Glu	Pro	Thr	Tyr	Pro	His	
1105					1110					1115					1120	
Gly	Leu	Arg	Val	Val	Tyr	Glu	Ser	Leu	Pro	Phe	Tyr	Lys	Ala	Glu	Lys	
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Ile	Val	Asn	Leu	Ile	Ser	Gly	Thr	Lys	Ser	Ile	Thr	Asn	Ile	Leu	Glu	
		1140						1145					1150			
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Asn	Arg	Asp	Lys	Arg	Glu	Ile	Leu	Ser	Met	Glu	Asn	Leu	Ser	Ile	Thr	
1185					1190					1195					1200	
Glu	Leu	Ser	Lys	Tyr	Val	Arg	Glu	Arg	Ser	Trp	Ser	Leu	Ser	Asn	Ile	
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Val	Gly	Val	Thr	Ser	Pro	Ser	Ile	Met	Tyr	Thr	Met	Asp	Ile	Lys	Tyr	
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Asn	Ser	Leu	Thr	Arg	Gly	Glu	Arg	Gly	Pro	Thr	Lys	Pro	Trp	Val	Gly	
1250						1255					1260					
Ser	Ser	Thr	Gln	Glu	Lys	Lys	Thr	Met	Pro	Val	Tyr	Asn	Arg	Gln	Val	
1265					1270					1275					1280	
Leu	Thr	Lys	Lys	Gln	Arg	Asp	Gln	Ile	Asp	Leu	Leu	Ala	Lys	Leu	Asp	
				1285					1290						1295	
Trp	Val	Tyr	Ala	Ser	Ile	Asp	Asn	Lys	Asp	Glu	Phe	Met	Glu	Glu	Leu	
			1300					1305					1310			
Ser	Ile	Gly	Thr	Leu	Gly	Leu	Thr	Tyr	Glu	Lys	Ala	Lys	Lys	Leu	Phe	
		1315					1320					1325				
Pro	Gln	Tyr	Leu	Ser	Val	Asn	Tyr	Leu	His	Arg	Leu	Thr	Val	Ser	Ser	
1330						1335					1340					
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1345					1350					1355					1360	
Tyr	His	Phe	Asp	Thr	Ser	Pro	Ile	Asn	Arg	Ile	Leu	Thr	Glu	Lys	Tyr	
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Gly	Asp	Glu	Asp	Ile	Asp	Ile	Val	Phe	Gln	Asn	Cys	Ile	Ser	Phe	Gly	
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Arg	Ile	Ile	Leu	Ile	Pro	Lys	Leu	Asn	Glu	Ile	His	Leu	Met	Lys	Pro	
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Pro	Ile	Phe	Thr	Gly	Asp	Val	Asp	Ile	His	Lys	Leu	Lys	Gln	Val	Ile	
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Gln	Lys	Gln	His	Met	Phe	Leu	Pro	Asp	Lys	Ile	Ser	Leu	Thr	Gln	Tyr	
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Ala	Tyr	Lys	Thr	Tyr	Leu	Leu	Cys	Phe	His	Lys	Gly	Tyr	Gly	Lys	Ala	
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Lys	Leu	Glu	Cys	Asp	Met	Asn	Thr	Ser	Asp	Leu	Leu	Cys	Val	Leu	Glu	1555	1560	1565
Leu	Ile	Asp	Ser	Ser	Tyr	Trp	Lys	Ser	Met	Ser	Lys	Val	Phe	Leu	Glu	1570	1575	1580
Gln	Lys	Val	Ile	Lys	Tyr	Ile	Leu	Ser	Gln	Asp	Ala	Ser	Leu	His	Arg	1585	1590	1595
Val	Lys	Gly	Cys	His	Ser	Phe	Lys	Leu	Trp	Phe	Leu	Lys	Arg	Leu	Asn	1605	1610	1615
Val	Ala	Glu	Phe	Thr	Val	Cys	Pro	Trp	Val	Val	Asn	Ile	Asp	Tyr	His	1620	1625	1630
Pro	Thr	His	Met	Lys	Ala	Ile	Leu	Thr	Tyr	Ile	Asp	Leu	Val	Arg	Met	1635	1640	1645
Gly	Leu	Ile	Asn	Ile	Asp	Arg	Ile	His	Ile	Lys	Asn	Lys	His	Lys	Phe	1650	1655	1660
Asn	Asp	Glu	Phe	Tyr	Thr	Ser	Asn	Leu	Phe	Tyr	Ile	Asn	Tyr	Asn	Phe	1665	1670	1675
Ser	Asp	Asn	Thr	His	Leu	Leu	Thr	Lys	His	Ile	Arg	Ile	Ala	Asn	Ser	1685	1690	1695
Glu	Leu	Glu	Asn	Asn	Tyr	Asn	Lys	Leu	Tyr	His	Pro	Thr	Pro	Glu	Thr	1700	1705	1710
Leu	Glu	Asn	Ile	Leu	Ala	Asn	Pro	Ile	Lys	Ser	Asn	Asp	Lys	Lys	Thr	1715	1720	1725
Leu	Asn	Asp	Tyr	Cys	Ile	Gly	Lys	Asn	Val	Asp	Ser	Ile	Met	Leu	Pro	1730	1735	1740
Leu	Leu	Ser	Asn	Lys	Lys	Leu	Ile	Lys	Ser	Ser	Ala	Met	Ile	Arg	Thr	1745	1750	1755
Asn	Tyr	Ser	Lys	Gln	Asp	Leu	Tyr	Asn	Leu	Phe	Pro	Met	Val	Val	Ile	1765	1770	1775
Asp	Arg	Ile	Ile	Asp	His	Ser	Gly	Asn	Thr	Ala	Lys	Ser	Asn	Gln	Leu	1780	1785	1790
Tyr	Thr	Thr	Ser	His	Gln	Ile	Ser	Leu	Val	His	Asn	Ser	Thr	Ser		1795	1800	1805
Leu	Tyr	Cys	Met	Leu	Pro	Trp	His	His	Ile	Asn	Arg	Phe	Asn	Phe	Val	1810	1815	1820
Phe	Ser	Ser	Thr	Gly	Cys	Lys	Ile	Ser	Ile	Glu	Tyr	Ile	Leu	Lys	Asp	1825	1830	1835
Leu	Lys	Ile	Lys	Asp	Pro	Asn	Cys	Ile	Ala	Phe	Ile	Gly	Glu	Gly	Ala	1845	1850	1855
Gly	Asn	Leu	Leu	Arg	Thr	Val	Val	Glu	Leu	His	Pro	Asp	Ile	Arg		1860	1865	1870
Tyr	Ile	Tyr	Arg	Ser	Leu	Lys	Asp	Cys	Asn	Asp	His	Ser	Leu	Pro	Ile	1875	1880	1885
Glu	Phe	Leu	Arg	Leu	Tyr	Asn	Gly	His	Ile	Asn	Ile	Asp	Tyr	Gly	Glu	1890	1895	1900
Asn	Leu	Thr	Ile	Pro	Ala	Thr	Asp	Ala	Thr	Asn	Asn	Ile	His	Trp	Ser	1905	1910	1915
Tyr	Leu	His	Ile	Lys	Phe	Ala	Glu	Pro	Ile	Ser	Leu	Phe	Val	Cys	Asp	1925	1930	1935
Ala	Glu	Leu	Ser	Val	Thr	Val	Asn	Trp	Ser	Lys	Ile	Ile	Ile	Glu	Trp	1940	1945	1950
Ser	Lys	His	Val	Arg	Lys	Cys	Lys	Tyr	Cys	Ser	Ser	Val	Asn	Lys	Cys	1955	1960	1965
Met	Leu	Ile	Val	Lys	Tyr	His	Ala	Gln	Asp	Asp	Ile	Asp	Phe	Lys	Leu	1970	1975	1980
Asp	Asn	Ile	Thr	Ile	Leu	Lys	Thr	Tyr	Val	Cys	Leu	Gly	Ser	Lys	Leu	1985	1990	1995
Lys	Gly	Ser	Glu	Val	Tyr	Leu	Val	Leu	Thr	Ile	Gly	Pro	Ala	Asn	Ile	2005	2010	2015



Phe Pro Val Phe Asn Val Val Gln Asn Ala Lys Leu Ile Leu Ser Arg  
                   2020                                  2025                                  2030  
 Thr Lys Asn Phe Ile Met Pro Lys Lys Ala Asp Lys Glu Ser Ile Asp  
                   2035                                  2040                                  2045  
 Ala Asn Ile Lys Ser Leu Ile Pro Phe Leu Cys Tyr Pro Ile Thr Lys  
                   2050                                  2055                                  2060  
 Lys Gly Ile Asn Thr Ala Leu Ser Lys Leu Lys Ser Val Val Ser Gly  
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 Asp Ile Leu Ser Tyr Ser Ile Ala Gly Arg Asn Glu Val Phe Ser Asn  
                                   2085                                  2090                                  2095  
 Lys Leu Ile Asn His Lys His Met Asn Ile Leu Lys Trp Phe Asn His  
                                   2100                                  2105                                  2110  
 Val Leu Asn Phe Arg Ser Thr Glu Leu Asn Tyr Asn His Leu Tyr Met  
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 Val Glu Ser Thr Tyr Pro Tyr Leu Ser Glu Leu Leu Asn Ser Leu Thr  
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 Thr Asn Glu Leu Lys Lys Leu Ile Lys Ile Thr Gly Ser Leu Leu Tyr  
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